We claim:

1. A method of estimating values for signals of a sequence of signals transmitted from a transmitter through a channel to a receiver, providing a received signal, the method employing a plurality of particles, each particle comprising a postulated transmitted signal history, the method comprising:

initialising a set of said particles;

evolving said set of particles over time using said received signal to generate a succession of evolved sets of particles;

tracing a plurality of paths through said succession of evolved sets of particles backwards in time; and

determining a sequence of values for said transmitted sequence of signals using said paths.

2. A method as claimed in claim 1 wherein said evolving of a set of particles comprises:

determining a set of candidate successor particles and associated candidate particle weights; and

selecting particles for an evolved set from said set of candidate particles based upon said weights.

3. A method as claimed in claim 2, comprising determining weights for said successor particles dependent upon said received signal.

4. A method as claimed in claim 3 wherein said determining of a said successor particle weight comprises comparing a postulated transmitted signal associated with said successor particle, modified by a response of said channel, with said received signal.

5. A method as claimed in claim 4 wherein said channel response is determined at least in part using said values for said transmitted sequence of signals.

6. A method as claimed in claim 2 wherein said weights define a probability distribution for said selecting, the method further comprising flattening said probability distribution prior to said selecting.

7. A method as claimed in claim 1 wherein said signal history comprises a history over a length of said channel.

8. A method as claimed in claim 1 wherein said path tracing comprises selecting transitions between particles of successively evolved sets of particles, working from a later set of particles to an earlier set of particles.

9. A method as claimed in claim 8 wherein said transition selecting selects only allowed transitions.

10. A method as claimed in claim 9 wherein a said allowed transition comprises a transition between particles which share at least a portion of their signal histories.

11. A method as claimed in claim 8 wherein each transition has an associated transition likelihood value and wherein said selecting of a transition is dependent upon said transition likelihood value.

12. A method as claimed in claim 1 wherein said values for said transmitted sequence of signals comprise likelihood values for signals of said sequence.

13. A method as claimed in claim 12 wherein said determining of said sequence of likelihood values for said transmitted signal sequence comprises determining a likelihood value for a most likely transmitted signal value at a time corresponding to an evolved set of particles for each evolved set of particles.

14. A method as claimed in claim 13 wherein said determining of a transmitted signal likelihood value for an evolved set of particles comprises counting the number of said paths through particles in said evolved set having said transmitted signal value at a time corresponding to said evolved set.

15. A method as claimed in claim 11 further comprising using said likelihood values as *a priori* information for repeating said evolving, tracing and determining for improving said estimating.

16. A method of estimating a transmitted sequence of signals comprising estimating likelihood values as claimed in claim 11 and estimating said transmitted sequence by making decisions on said transmitted signals of said sequence using said likelihood values.

17. A method as claimed in claim 16 wherein said transmitter has a plurality of transmit antennas and wherein a said particle comprises a postulated signal history for each said transmit antenna.

18. A method as claimed in claim 1 wherein said transmitter has a plurality of transmit antennas and wherein a said particle comprises a postulated signal history for each said transmit antenna.

19. A method as claimed in claim 1 in which said evolving over time and said tracing backwards in time comprises additionally or alternatively evolving over frequency and tracing backwards in frequency.

20. A method of equalising received signal data using the method of claim 1.

21. A carrier carrying processor control code to, when running, implement a method of estimating values for signals of a sequence of signals transmitted from a transmitter through a channel to a receiver, providing a received signal, the method employing a plurality of particles, each particle comprising a postulated transmitted signal history, the method comprising:

initialising a set of said particles;

evolving said set of particles over time using said received signal to generate a succession of evolved sets of particles;

tracing a plurality of paths through said succession of evolved sets of particles backwards in time; and

determining a sequence of values for said transmitted sequence of signals using said paths.

22. A signal estimator for estimating values for signals of a sequence of signals transmitted from a transmitter through a channel to a receiver providing a received signal, the estimator employing a plurality of particles, each particle comprising a postulated transmitted signal history, the estimator comprising:

means for initialising a set of said particles;

means for evolving said set of particles over time using said received signal to generate a succession of evolved sets of particles;

means for tracing a plurality of paths through said succession of evolved sets of particles backwards in time; and

means for determining a sequence of values for said transmitted sequence of signals using said paths.

23. An equaliser including the signal estimator of claim 22.

24. A signal processor configured to provide a soft output of transmitted signal values from a received signal comprising:

a first filter configured to generate a time sequence of sets of samples from populations of candidate samples weighted using said received signal, each sample corresponding to a sequence of transmitted signal values;

a second filter to select a plurality of time sequences of said samples from said time sequence of sets of samples; and

a signal estimator to estimate a sequence of transmitted signal values from said plurality of sample time sequences to provide said soft output.

25. A signal processor as claimed in claim 24 wherein said first filter is configured to generate said time sequence by selecting said sets of samples from said populations in accordance with said weighting of said candidate samples.

26. A signal processor as claimed in claim 25 wherein said weighting is further dependent upon a channel response for a channel between said transmitter and said receiver.

27. A signal processor as claimed in claim 24 wherein said second filter is configured to select a said time sequence by tracing a path of allowed transitions between said samples of said sets of samples.

28. A signal processor as claimed in claim 27 wherein said tracing traces from a first sample to a second sample, said second sample representing a sequence of signal values for an earlier time than said first sample.

29. A signal processor as claimed in claim 24 wherein said first filter comprises a particle filter.

30. A signal processor as claimed in claim 24 wherein said received signal comprises signals received simultaneously from a plurality of transmitting devices, and wherein said signal processor configured for estimating a sequence of transmitted signal values for each said transmitting device.

31. An equaliser incorporating the signal processor of claim 24.

32. A signal processor configured to provide a hard output of transmitted signal values from a received signal comprising: a signal processor configured to provide a soft output of transmitted signal values from a received signal comprising:

a first filter configured to generate a time sequence of sets of samples from populations of candidate samples weighted using said received signal, each sample corresponding to a sequence of transmitted signal values;

a second filter to select a plurality of time sequences of said samples from said time sequence of sets of samples; and

a signal estimator to estimate a sequence of transmitted signal values from said plurality of sample time sequences to provide said soft output, and

decision means to provide a hard output from said soft output.

33. A signal processor as claimed in claim 32 wherein said received signal comprises signals received simultaneously from a plurality of transmitting devices, and wherein said signal processor configured for estimating a sequence of transmitted signal values for each said transmitting device.

34. An equaliser incorporating the signal processor of claim 32.

35. Processor control code to, when running, implement a signal processor configured to provide a soft output of transmitted signal values from a received signal comprising:

a first filter configured to generate a time sequence of sets of samples from populations of candidate samples weighted using said received signal, each sample corresponding to a sequence of transmitted signal values;

a second filter to select a plurality of time sequences of said samples from said time sequence of sets of samples; and

a signal estimator to estimate a sequence of transmitted signal values from said plurality of sample time sequences to provide said soft output.

36. A signal processor configured to provide a hard output of transmitted signal values from a received signal comprising:

a signal processor configured to provide a soft output of transmitted signal values from a received signal comprising:

a first filter configured to generate a time sequence of sets of samples from populations of candidate samples weighted using said received signal, each sample corresponding to a sequence of transmitted signal values;

a second filter to select a plurality of time sequences of said samples from said time sequence of sets of samples; and

a signal estimator to estimate a sequence of transmitted signal values from said plurality of sample time sequences to provide said soft output; and

decision means to provide a hard output from said soft output.